XX-44

Kollodnij Zhurnal, XVII, 1955, No. 1 (Colloidal Journal)
(Translation from Russian)

Regulation of Dispersion of Liquid Aerosols, Produced by Way of Condensation by A. G. Amelin and M. J. Beliakov

Liquid aerosols are produced by two different methods: by mechanical dispersion and by condensation. The advantages of the condensation method are simplicity and less expense. No compressors are necessary as with mechanical dispersion methods.

Aerosol alone or the mixture of aerosol and its solvent is brought to a boil and then mixed with air. As a result the liquid aerosol coming in contact with the much colder air condenses in droplets.

It is desirable to vary the size of the droplets depending on the nature of the objects to be sprayed. For instance, on closed premises small droplets are more advantageous, whereas on open fields larger droplets are desirable, because small droplets would be carried away by the wind and thus prove useless.

Therefore, the aerosol machines need regulating devices for control of dispersion.

Condensation of liquid aerosols takes place in the presence of superheated vapors, when the occurring superheating reaches the critical magnitude or even surpasses it.

$$S = S_{crit.} \qquad (1)$$

$$S = \frac{P}{P_h} \qquad (2)$$

$P = \frac{\text{vapor}}{\text{pressure}}$ in the gas

P_h - pressure of the superheated vapors

P_h is a function of the temperature, therefore (2) can be expressed this way

$$S = \frac{P}{f(T)} \qquad (3)$$

It is necessary to know the vapor pressure in the gas mixture and its temperature. These depend on the relationship between the mixing currents of gases, which can be expressed like this:

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XX-45

GUARDING COTTONS AGAINST MICRO-ORGANISM DAMAGE

From: Chlopkovodstvo ("Cotton Industry") 1955
5 (1) pp 48 - 54

Dr. F. Hetagurova - Institute of Applied Zoology

Micro-organisms infest cotton during growth but mainly during storage and also may affect it during processing.

The cotton is eaten up starting from the inside canal, which at the early stages gives it a normal appearance. Responsible are mainly epiphitic (surface active) bacteria of cotton plants. The micro-organisms exist already inside the seed capsules. When the capsules burst, new micro-organisms reach the fibers from outside.

Micro-organisms secrete certain ferments, which do the damage.

Cellulose bacteria and fungi destroy the cellulose walls. Micro-organisms eat the canal contents--protoplasma, others the pectins of the walls.

All this damage causes a lot of production trouble.

The cotton classers so far have no methods of finding out beforehand about this damage.

Of utmost importance next to storage conditions is the condition of cotton before storage. Two ways of counter-action against microbial damage can be taken:

(1) Increase the stability of cotton regarding micro-organisms.

(2) Prevent micro-organisms from development before and during storage.

Only a few specialists so far are interested in these problems.

Microbiological control is necessary. It eventually should be introduced into all cotton laboratories. This paper describes the methods and also gives advice regarding future plans.

Microscopy is used for detecting micro-organism damage. For reference purposes five types of damage are described.

The cotton is stained with Eritrosine (one part of alcoholic solution of eritrosin in nine parts water), then rinsed in water and observed

TRANSLATION

XX-46

OF

THE DECOMPOSITION OF SOLID SOLUTIONS IN PHOSPHORUS-SULFUR SYSTEMS

by

V. V. Illarionov and T. I. Sokolova

Izvest. Akad. Nauk S.S.S.R., Fiz. Khim. 21, 153-158 (1952)

It is known that elementary phosphorus and sulfur do not enter into a chemical reaction, forming solutions, below 100°. One freezing, two solid solutions separate: one based on phosphorus, the other based on alpha sulfur. The eutectic, corresponding quite closely to the composition P_4S, for a long time was accepted as an individual compound, and only after the thermal study made by Boulloush (1) was the question finally settled negatively. Boulloush established the lines of the liquidus and the solidus precisely, but did not investigate the decomposition equilibrium curves of the solid phases.

Both α-sulfur and white phosphorus have crystalline molecular lattices, formed in the first case by eight-membered rings of sulfur (2), and in the second, by tetrahedral tetra-atomic molecules of phosphorus. (In connection with this, it may be noted that under x-ray radiation, white phosphorus is converted into the colored form, the structure of which is not definitely known (3). Molten white phosphorus and vapors thereof consist of tetrahedral tetra-atomic molecules).

Study of the equilibrium curves of decomposition of the solid phases was interesting in this system particularly, since the diffusion processes in the solid phases must proceed at a low rate, not altering the essential form of these compositions in the heating during the duration of the study.

The goal of the present work consists of a knowledge of the form of the equilibrium curves of decomposition of the solid solutions in the system under study.

Commercial white phosphorus was distilled twice under a high vacuum (10^{-4} mm. Hg). The sulfur, to purify it of selenium and arsenic, was distilled three times from retorts, two-thirds of the charge being discarded each time, and then, to free it of bitumens, it was purified by the procedure of Bacon and Panelli (4), by 100 hours boiling with magnesium oxide. The preparation which was obtained was absolutely pure; however, on cooling, besides the monoclinic modification of the sulfur, which is soluble in CS_2, enantiotropically going over into the rhombic form at 95.5°, which is likewise soluble in CS_2, the melt contained γ-sulfur, which is insoluble in CS_2. The amount of γ-sulfur varies with the rate of cooling of the sulfur and establishment of the equilibrium in the melt. This form of sulfur corresponds to the μ-modification of liquid sulfur, the amount of which equals 3.6%, according to Kruyt's study (5), when equilibrium is established at the crystallization temperature. (According to Aten (6), equilibrium compositions including sulfur are somewhat different).

XX-47

(46) SYNTHESIS OF ε-CAPROLACTAM BY THE SCHMIDT REACTION

by

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(Received on June 4, 1952)

* * *

1. INTRODUCTION

The conventional method for the preparation of ε-caprolactam from cyclohexanone is to carry out a Beckmann rearrangement on the oxime. However, a method has been discovered by Schmidt (1) in which a lactam is prepared directly by the action of hydrazoic acid on ketones, and Iwakura, et al. (2) have improved this method and have prepared ε-caprolactam by the gradual addition of a chloroform solution of sodium azide to a sulfuric acid solution of cyclohexanone; the yield of the lactam from cyclohexanone was around 55 per cent. In the present paper a method is described for the synthesis of the lactam in a yield better than 80 per cent by the gradual addition of sulfuric acid to a mixture of cyclohexanone, sodium azide, and water, at a temperature below 50° C. It is also interesting as a ring enlargement reaction for cyclic ketones by the action of hydrazoid acid.

2. EXPERIMENTAL PART AND RESULTS

A. Synthesis of the Lactam With Sodium Azide.

A mixture of 20 g. of cyclohexanone (91.8%), 15 g. of sodium azide, and a certain amount of solvent placed in a one-liter three-necked flask was heated on the steam bath to a fixed temperature, and to this mixture sulfuric acid was added from a separatory funnel in the course of 2.5 hours. After the dropwise addition had been completed, the mixture was stirred for one more hour and then the reaction was terminated. It was subsequently cooled, neutralized with aqueous ammonia at a temperature lower than 20° C., and the lactam was extracted with chloroform. The lactam content of the chloroform solution was determined by the formol method. The analytical results were in good agreement with the data obtained by distilling the chloroform solution and collecting the fraction boiling in the range of 140 to 145° C. at 12 mm. Hg. The experimental results were as follows.

1) The Effect of Solvent. In cases when benzene, chloroform, or carbon tetrachloride were employed as the solvent, the addition of sulfuric acid caused formation of a considerable amount of white emulsion, which adhered to the walls of the flask and hindered the occurrence of a smooth reaction. This white emulsion is presumably the lactam sulfate which is insoluble in benzene, chloroform, etc. Omission of solvent gave a brown-black product. When water is used as the solvent, the emulsion is not formed, and the produced lactam sulfate in water, and the reaction proceeds smoothly, the yield is also at its